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EXAMINER
THORNTON, YVETTE C

ART UNIT	PAPER NUMBER
1752	

DATE MAILED: 07/01/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/901,933	Applicant(s) FOSTER ET AL.
	Examiner Yvette C. Thornton	Art Unit 1752

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 April 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *14-24,27-31 and 33-48* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *34-48* is/are allowed.

6)☒ Claim(s) *14-17 21-22 27-28. 30 33* is/are rejected.

7)☒ Claim(s) *18-20,23,24,29 and 31* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

This is written in reference to application number 09/901933 filed on July 9, 2001.

Response to Amendment

1. Claims 25-26 and 32 have been cancelled.

2. Claims 14-24, 27-31 and 33-48 are currently pending.

3. The amendments to the said claims are sufficient to overcome the claim objections and claim rejections set forth in the previous office action.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 14-17, 27-28 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pavelchek et al. (US 6316165 B1) in view of Bailey et al. (US 4788127 A). Pavelchek teaches a radiation absorbing composition suitable for use as antireflective coating (ARC) compositions with photoresist compositions (c. 2, l. 10-12). The said composition comprises a low molecular weight polymer resin, which is capable of providing a highly planarizing coating (c. 4, l. 32-35). The said resin is preferably synthesized by polymerizing two or more different monomers where at least one of the monomers includes a chromophore group (c. 5, l. 43-47). Crosslinking-type antireflective compositions of the invention also generally contain a crosslinker component. A variety of crosslinkers may be

employed. Suitable examples include amine-based crosslinkers such as melamine materials, glycourils, benzoquanamines and urea-based materials. Low basicity antireflective composition crosslinkers are particularly preferred such as a methoxy methylated glycouril corresponding to given formula (III) (c. 8, l. 15-56). Crosslinking antireflective compositions of the taught invention preferably further comprise an acid or acid generator compound, particularly a thermal acid generator for catalyzing or promoting crosslinking during curing of an antireflective coating layer. A variety of known thermal acid generators are suitably employed such as 2,4,4,6-tetrabromocyclohexadienone, benzoin tosylate, 4-nitrobenzyl tosylate and other alkylesters of organic sulfonic acids (c. 9, l. 12-67).

6. Example 5 exemplifies an ARC composition comprising a terpolymer resin of 9-anthracenemethyl methacrylate, 2-hydroxyethyl methacrylate and methyl methacrylate; POWDERLINK 1174 crosslinker (methoxy methylated glycouril c. 8, l. 53-56); and an acid generator di-t-butyl diphenyl iodonium camphorsulfonate. The liquid ARC is spin coated onto a silicon wafer and thermally cured for 60 seconds. The cured ARC is then overcoated with a positive acting photoresist UV5. The resist layer is soft-baked, exposed to patterned radiation, post-exposure baked and developed with an alkaline aqueous solution. The underlying ARC layer is etched with an oxygen/fluorocarbon plasma (c. 16, l. 50-c. 17, l. 9). It is the examiner's position that the taught terpolymer meets the limitation of a hydroxyl-containing polymer; the taught POWDERLINK 1174 crosslinker meets the limitation of an amino crosslinking agent; and di-t-butyl diphenyl iodonium camphorsulfonate meets the limitation of a thermal acid generator.

7. Pavelchek as discussed above teaches all the limitations of the claims except it fails to exemplify a thermal acid generator of the general structure of instant claim 16 or a cross-linking agent of the general formula of instant claim 27. Pavelchek does however teach that a variety of known thermal acid generators are suitably employed such as 2,4,4,6-tetrabromocyclohexadienone, benzoin tosylate, 4-nitrobenzyl tosylate and other alkylesters of organic sulfonic acids (c. 9, l. 12-67). It is the examiner's position that benzoin tosylate and 4-ntirobenzyl tosylate meets the limitations of instant claims 16. One of ordinary skill in the art would have been motivated to use any of the taught thermal acid generators in an antireflective composition such as that exemplified in example 5. Furthermore, Pavelchek teaches that a variety of crosslinkers may be employed. Suitable examples include amine-based crosslinkers such as melamine materials, glycourils, benzoquanamines and urea-based materials. It is the examiner's position that a melamine derivative would meet the limitation of instant claim 27. One of ordinary skill in the art would have been motivated to use any of the taught amine based crosslinkers in an antireflective composition such as that exemplified in example 5. One of ordinary skill in the art would have been motivated by the teaching of Pavelchek to coat a substrate with an antireflective coating comprising a resin material such as that synthesized in example 1 that comprises a hydroxy containing monomer; a melamine crosslinker component; and benzoin tosylate or 4-nitrobenzyl tosylate as a thermal acid generator in order to form an antireflective coating which is overcoated with a positive photosensitive resist, exposed and developed the formed element to provide a relief images that permits selective processing of a substrate (c. 1, l. 20-25).

8. Pavelchek teaches a process wherein a resist is overcoated the taught antireflective and antihalation layer. Pavelchek exemplifies the use of UV5 photoresist from Shipley but fails to offer any further detail about the specific photoresist. One of ordinary skill in the art would have been motivated to use any photoresist composition which is conventionally used in bilayer resist systems. Bailey (US 4788127) teaches a photoresist composition comprising a photosensitive compound and an interpolymer of a silicon-containing monomer and an hydroxystyrene. The resist composition exhibits superior thermal stability and dissolution rate and good resistance to an oxygen plasma etch (abstract). Bailey teaches that the said composition is preferably used in bilevel resist systems coated on a support (c. 2, l. 44-48). One of ordinary skill in the art would have been motivated by the teachings of Bailey to use a photosensitive composition comprising a silicon-containing monomer as the topcoat photosensitive layer of Pavelchek in order to improve thermal stability, dissolution rate and etch resistance of the formed element.

9. Claims 14-16, 21-22, 27-28, 30 and 33 are rejected under 35 U.S.C. 102(e) as being anticipated by Thackeray et al. (US 6165697 A) in view of Bailey et al. (US 4788127 A).

Thackeray teaches an antihalation composition comprising a resin binder and a material capable of causing a thermally induced crosslinking reaction of the resin binder (abstract). The said composition may further comprise an acid or acid generator compound to catalyze the reaction between the resin binder and the crosslinking compound (c. 2, l. 63-67). A particularly preferred antihalation composition comprises an amine-based thermal crosslinker and a phenol based resin binder (c. 3, l. 54-c.4, l. 54). Suitable amine-based thermal crosslinkers include melamine-formaldehyde resins, glycoluril-formaldehyde resins

and urea-based resins. Suitable phenol based resin binders include novolak resins; poly(vinylphenols) and copolymers of the same with styrene; poly(meth)acrylic acid copolymers; copolymers containing 2-hydroxyethylmethacrylate and 2-hdyroxypropylmethacrylate; polyvinyl alcohols; and alkali soluble styrene-allyl alcohol copolymers (c. 4, l. 20-31). Preferably a thermal acid generator is employed. A variety of known thermal acid generators are suitably employed such as 2,4,4,6-tetrabromocyclo-hexadienone, benzoin tosylate, 4-nitrobenzyl tosylate and other alkylesters of organic sulfonic acids (c. 6, l. 11-40). Example 1 exemplifies an antihalation composition comprising novolak resin binder, hexamethoxymethylmelamine crosslinker and 2,4,4,6-tetrabromocyclohexa-dienone as the thermal acid generator. Example 3 exemplifies the said composition (ex. 1) being coated on a silicon wafer and baked. The wafer was then overcoated with a deep UV photoresist. The wafer was exposed on a excimer laser stepper, post-baked and developed to form a pattern. Thackeray also teaches that bared antihalation layer can be removed and the underlying substrate can be altered (see c. 9, l. 34-53 and claim 1).

10. Thackeray teaches all the limitations of the claims except it fails to exemplify a thermal acid generator of the general structure of instant claim 16 or a cross-linking agent of the general formula of instant claim 27. Thackeray does however teach that a variety of known thermal acid generators are suitably employed such as 2,4,4,6-tetrabromocyclo-hexadienone, benzoin tosylate, 2-nitrobenzyl tosylate and other alkylesters of organic sulfonic acids (c. 6, l. 11-40). It is the examiner's position that benzoin tosylate and 2-nitrobenzyl tosylate meets the limitations of instant claims 16. One of ordinary skill in the art would

have been motivated to use any of the taught amine based crosslinkers in an antireflective composition such as that exemplified in example 1.

11. Thackeray also fails to teach a hydroxyl containing polymer comprising styrene and an allyl alcohol as set forth in instant claim 21. Thackeray does teach that suitable phenol based resin binders include novolak resins; poly(vinylphenols) and copolymers of the same with styrene; poly(meth)acrylic acid copolymers; copolymers containing 2-hydroxyethylmethacrylate and 2-hydroxypropylmethacrylate; polyvinyl alcohols; and alkali soluble styrene-allyl alcohol copolymers (c. 4, l. 20-31). One of ordinary skill in the art would have been motivated to use any of the taught phenol based resin binders in the taught composition. One of ordinary skill in the art would have been motivated by the teaching of Thackeray to coat a substrate with an antihalation composition comprising a phenol based resin material such as a styrene-allyl alcohol copolymer; a melamine crosslinker component; and benzoin tosylate or 2-nitrobenzyl tosylate as a thermal acid generator in order to form an antireflective coating which is overcoated with a positive photosensitive resist, exposed and developed the formed element to provide a relief images that permits selective processing of a substrate (see claim 1). One of ordinary skill would expect that a styrene-allyl alcohol copolymer would at least have a monomeric ration of 50:50.

12. Thackeray teaches a process wherein a resist is overcoated the taught antireflective and antihalation layer, respectively. Thackeray exemplifies the use of MEGAPOSIT SNR248-1.0 from Shipley but fails to offer any further detail about the specific photoresist. One of ordinary skill in the art would have been motivated to use any photoresist composition which conventionally used in bilayer resist systems. Bailey (US 4788127)

teaches a photoresist composition comprising a photosensitive compound and an interpolymer of a silicon-containing monomer and an hydroxystyrene. The resist composition exhibits superior thermal stability and dissolution rate and good resistance to an oxygen plasma etch (abstract). Bailey teaches that the said composition is preferably used in bilevel resist systems coated on a support (c. 2, l. 44-48). One of ordinary skill in the art would have been motivated by the teachings of Bailey to use a photosensitive composition comprising a silicon-containing monomer as the topcoat photosensitive layer of Thackeray in order to improve thermal stability, dissolution rate and etch resistance of the formed element.

Allowable Subject Matter

13. Claims 18-20, 23-24, 29 and 31 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

14. Claims 34-48 are allowed.

15. The following is a statement of reasons for the indication of allowable subject matter: review of the prior art failed to teach and/or suggest the use of the specific compounds of instant claims 19, 23 and 26 in combination with an amino crosslinking agent and a thermal acid generator as set forth in the instant claims. Newly submitted claims 39 and 46 include the limitations of claim 23 in independent form. The prior art also failed to teach and/or suggest a cycloaliphatic ester of (meth)acrylic acid units as set forth in instant claims 18, 34 and 42.

Response to Arguments

16. Applicant's arguments filed with respect to the instant claims have been fully considered but they are not persuasive. Applicants argue that there is no motivation for one of ordinary skill in the art to combine the references of Pavelchek or Thackeray and Bailey. As set forth above, one of ordinary skill in the art would have been motivated by the teachings of Bailey to use a photosensitive composition comprising a silicon-containing monomer as the topcoat photosensitive layer of Pavelchek or Thackeray in order to improve thermal stability, dissolution rate and etch resistance of the formed element. Bailey teaches that the taught composition is particularly useful in conjunction with exposure sources emitting form 250 nm to 450 nm (c. 6, l. 10-15), however it does not teach away form using lower wavelength exposure. One of ordinary skill in the art would have a reasonable expectation of success with the expectation that a lower wavelength would not give enhanced results. Furthermore, Pavelchek teaches that the taught resist layer is imaged with activating radiation through a mask in conventional manner (c. 15, l. 3-4). One of ordinary skill in the art would have been motivated to use any wavelength of exposure.

17. Applicants also argue that the composition of Bailey is not chemically amplified as required by the instant claims. It is the examiner's position that the silicon containing moiety of the taught polymer is readily acid labile thereby meeting the limitation of being chemically amplified.

Conclusion

18. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

19. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

20. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yvette C. Thornton whose telephone number is 703-305-0589. The examiner can normally be reached on Monday-Thursday 8-6:30.

21. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Janet C. Baxter can be reached on 703-308-2303. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

22. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1495.

yct
June 29, 2003

JANET BAXTER
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700